would tend to deny to others the good which he himself had received? He confessed that he did not wholly understand the cry which had been raised of the external student—the cry which had been used, and, if he might say so, skilfully used, to clog the voting in his favour. When he listened to some expressions it seemed to him that the cry meant "We are in possession, and we are unwilling that others should share it with us." But he could not believe that to be meant, because it was a spirit which was wholly repugnant to the spirit of the University. And in any case he himself, looking all round, could not think otherwise than that the great future which he believed lay before the University in its new form would bring good to all alike who took part in it. At all events, he should hold it to be his duty to labour in the House, not for the interests of any particular class of the University, be they doctors or lawyers, men of letters, men of science, or men of business, internal or external students, teachers or taught, men or women, but he should strive to do his best for the common good of all.

NOTES.

THE sum of 3000*l.*, previously allotted for the purchase of plant for the detachment of the Electrical Engineers Volunteer Corps going to the front, is to be increased to 5000*l.*

THE death is announced of M. Emile Blanchard, member of the Paris Academy of Sciences, in the section of anatomy and zoology.

THE introduction of the metric system of weights and measures in Russia seems to be not far off. A scheme to that effect, prepared by the Ministry of Finances, has already received the approval of the Council of State, on the condition that it should be supplemented by a scheme for organising the aid, which different scientific societies and the universities are ready to render, in the verification of the new weights and measures for commerce. This latter scheme is nearly ready, and will shortly be brought before the Council of State. In the military pharmacopœia, published in 1896, all measures are already given in the metric system, which has thus been rendered obligatory for the medical staff of the army.

WE learn that traffic has just been opened on the Trans-Baikalian section, 700 miles long, of the Siberian railway, as far as Sryétensk. This little town, situated on the Shilka, is in the summer the head of a regular steam-navigation along the Amur, and, with the interruption offered by Lake Baikal, which has still to be crossed on a steamer, Sryétensk can now be reached by rail from Moscow, a distance of about 5000 miles.

AT the last meeting of the French Astronomical Society, Baron La Baume Pluvinel gave an account of the results of his inquiry into the conditions for observing the forthcoming total solar eclipse in Spain. He said that the railway service is bad; trains are very slow, and only leave Madrid once a day. The chief party of the Society will make their observations from Alicante, which is situated at the base of a high cliff, crowned by the strong Fort St. Barbara, and on one side sinks sheer down to the sea. A friend of the Society has placed a steamer at the disposal of the observers, free of charge. In addition to this steamer moored off the coast of Spain, another, with a party of astronomers on board, will go to Algiers. Mr. Percival Lowell and Prof. D. P. Todd have already left the United States to proceed to some suitable station in North Africa, from which to observe the eclipse. Mr. A. E. Douglass will make simultaneous observations under Mr. Lowell's auspices in Georgia. Messrs. Cook and Son have arranged a conducted tour to Talavera, where the total phase will be visible. The party will leave London on May 21, and will visit Paris, Bordeaux, Biarritz, and Madrid on the way.

WE learn from *Science* that the American Academy of Arts and Sciences has granted from the income of the Rumford fund 500 dollars to Prof. E. C. Pickering, for the purpose of carrying out an investigation on the brightness of faint stars, by co-operation with certain observatories possessing large telescopes, and 100 dollars to Prof. T. W. Richards, in aid of a research on the transition points of crystallised salts.

MENTION has already been made of many of the congresses to be held in connection with the forthcoming International Exposition at Paris. The following list, prepared by the committee of the Paris International Assembly, the secretaries of which are Prof. Patrick Geddes and Mr. T. R. Marr, shows the dates of some of the more important congresses announced in science and education:—Pure Science: Ornithology, June 26-30; meteorology, July 23-28; physics, August 6-11; mathematics, August 6-11; geology, August 16-28; electricity, August 18-25; anthropology and archæology, August 20-25; psychology, August 22-25; ethnography, August 26–September 1; chemistry, September 20-29; botany, October 1-6. Applied Science and Associated Industry: Horticulture, May 25-27; forestry, June 4-7; mines and metallurgy, June 18-23; vine cultivation, June 20-23; insurance, June 25-30; actuaries, June 25-30; agriculture, July 1-7; testing of materials, July 9-16; steam engines and machinery, July 16 18; applied mechanics, July 19-25; architecture and naval construction, July 19-21; photography, July 23-28; applied chemistry, July 23-31; navigation, July 30–August 4; pharmacy, August 8; economic and commercial geography, August 23-31; tramways, September 10-12; fruit culture, September 13-14; railroads, September 20-29. Medicine and Hygiene: Homœopathy, July 18-21; professional medicine, July 23-28; medicine, August 2-9; dermatology, August 2 9; dentistry, August 8-14; hygiene, August 10-17; hypnotism, August 12-15. Education: Modern language teaching, July 24-29; higher education, July 30–August 3; teaching of social science, July 30–August 5; primary education, August 2-5; secondary education, August 2-5; technical, industrial education, August 6-11; educational press, August 9-11; bibliography, August 16-18; teaching of drawing, August 29–September 1; popular education, September 10-13; agricultural instruction, September 14-16.

THE death is announced of Prof. Thomas Egleston, Professor of mineralogy and metallurgy in the school of mines of Columbia University, at the age of sixty-seven years.

Science announces that Prof. Reginald A. Fessenden, of the electrical engineering department of the Western University of Pennsylvania, has resigned his chair to accept a position in the Signal Department of the United States Weather Bureau, at Washington.

THE Simplon tunnel is now progressing at the rate of sixteen feet per day. It was begun fourteen months ago, and must be finished in five years and a half from its commencement.

THE proposal of the Council of the Royal Astronomical Society, that the meetings should in future be held at five o'clock, was rejected by the annual meeting on Friday last, and the ordinary meetings will therefore continue to be held at eight o'clock. Taylor's Calendar of the meetings of the scientific bodies of London shows that the number of societies which commence their meetings about eight o'clock is more than twice as great as the number of those which meet at four or five o'clock.

WE learn from the *Scientific American* that a special commission has been appointed to report on the ruins of the cliffdwellers in the vicinity of Mancos and Cortes, Colorado, and also near Aztec, Mexico, with the idea of reserving the lands as a national park. This action has been taken as a result of an agitation in Colorado for the protection of these ruins against vandalist relic hunters. Some of the best preserved ruins have been ruthlessly entered by curio hunters, who have broken through walls and roofs and carried away the relics. It would be a wise policy for the U.S. Government to have these ruins guarded, so that they can be investigated by experts. Fortunately, some of the best of them have not been tampered with as yet.

A NOTE upon recent improvements in the production of electrolytic copper appears in *Engineering*, and the following particulars have been obtained from it. It is a comparatively simple matter to get a good deposit of copper electrolytically, provided always that a sufficiently low current density is used. This, of course, involves a very large and expensive plant if any reasonable output of the metal is desired. With greater current densities difficulties make their appearance, and the deposit, in place of being smooth and homogeneous, becomes granular and lacks cohesion. By certain devices of one nature or another, the troubles referred to above have been largely overcome. The effect of these is shown by the fact that 10 years ago an electrolytic bath for the deposition of copper commonly contained 75 to 100 times as much metal in solution as was deposited in 24 hours. Nowadays these figures have been reduced to one-fifth of the values stated. As a consequence, the proportion of the metal obtained in the wet way has been enormously increased, the world's production being now estimated at 500 tons of electrolytic copper per diem. One of the earlier plans of increasing the output was that introduced by Elmore, in which an agate burnisher was caused to continuously pass over the surface on which the deposit was being made. The resultant metal proved to be of extraordinary strength. In a more recent development, a sheepskin impregnated with animal fat is used as a burnisher. Quite recently Mr. Sherard Cowper-Coles has hit upon another plan, in which the copper is deposited on a vertical mandril, which is caused to rotate at a very rapid rate. The centrifugal force developed and the wash of the electrolyte over the rotatory surface keeps the latter clean and free from gas, and as a consequence a smooth and dense deposit has been obtained with current densities approaching 200 ampères per square foot. An account of the process, together with details of the mechanism used, will be found in a paper recently read by Mr. Cowper-Coles before the Institution of Electrical Engineers.

THE Deutscher Mathematiker Vereinigung, which holds its meetings concurrently with the Naturforscherversammlung, has published the report of its meeting at Munich last year. The meeting was attended by about eighty members, and twenty-two papers were read, including a discussion on the decimalisation of angles and of time. Upon the proposal of Prof. Boltzmann, a committee was appointed to consider the terminology of mathematical physics. The next meeting will be held at Aachen, in September 1900.

OF the six first numerals in the Etruscan language, viz. *maχ*, *θu*, *zal*, *huθ*, *ci*, *s'a*, it has been remarked by Prof. Thomsen, in a communication to the Danish Academy, that we do not know their precise order. M. E. Elia Lattes, writing in the *Rendiconti del R. Istituto Lombardo*, discusses the value of the numeral *θu*, and the examination of old inscriptions in which this word and its derivatives occur would appear in conformity with the view previously expressed that *θu* stood for "two."

IN the *Transactions* of the Institution of Engineers and Shipbuilders in Scotland, xliii. (2), (3), Mr. W. J. Luke discusses the means adapted for moderating the rolling of ships, and in particular Froude's experiments. The principal point brought out by the paper, and the discussion on it, is the efficacy of bilge keels in extinguishing rolling motion, a result no doubt largely due to the discontinuous motion of the water past the sharp edges of the keels in each swing of the ship.

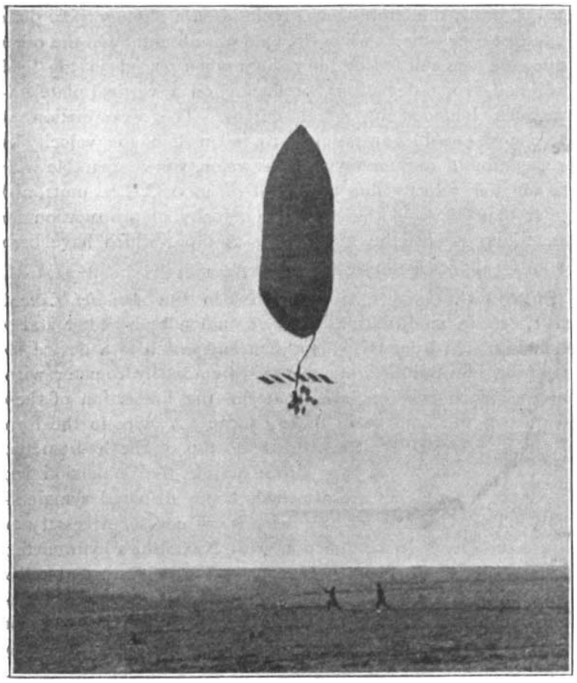
THE *Rendiconto* of the Naples Academy, v. 8–12, contains the abstract of a paper by Prof. E. Ascione, on the properties of conicoids with elliptic points, viz. the ellipsoid, hyperboloid of two sheets, and elliptic paraboloid deduced from projections made by taking an umbilicus as the vertex of conical projection, and a plane parallel to the tangent plane at the umbilicus as the plane of projection. The projections of the focal conics are evidently circles, and the author finds that the projections of the lines of curvature are obtainable by a simple geometrical construction. The method, which includes stereographic projection of a sphere as a particular case, would appear likely to lead to a number of not difficult problems in analytical solid geometry.

THE properties of certain radio-active bodies form the subject of a short note by M. Henri Becquerel (*Comptes rendus*, cxxix. 26, 1899). The nitrate of polonium, of which samples were provided by M. and Mme. Curie, was found to be nearly as active as radium, both in its power of rendering air a conductor, and in its action on a photographic plate; but the radiation from this compound did not experience any modifications in a magnetic field, such as occurred with radium. When the polonium preparation was placed in a magnetic field of from 4000 to 10,000 C.G.S. units, the impressions obtained on a photographic plate were just the same as when the field was absent. On the other hand, the rays emitted by the radium when placed in the field exhibited strong deviations, producing on a vertical plate impressions bounded by spiral curves. The examination of these curves enables an estimate to be made of the velocity of propagation of radium rays. This velocity is comparable with the angular velocity due to a field of 4000 C.G.S. units, and under plausible hypotheses give a velocity of propagation for the radium rays of the same order as those which have been found for the kathodic rays.

SIGNOR G. GUGLIELMO describes in the *Atti dei Lincei*, ix. 1, certain modifications of the common hydrometer and of Nicholson's hydrometer. His first suggestion is a device for attaching movable weights to the common hydrometer without the inconveniences arising from the immersion of these weights in the fluid as in Sikes's form. A wire in the form of an inverted U is attached to the top of the hydrometer, and to its ends, which hang down outside the immersion jar, the movable weights are attached, being disposed symmetrically. The U-shape of the wire is, of course, necessary to ensure stability. In conjunction with Nicholson's hydrometer, Signor Guglielmo recommends the use of a graduated pillar for reading off small differences of density to avoid the difficulties involved in immersing the instrument exactly to a fixed mark. Finally, a "hydrostatic balance" is described, by which is meant, not the hydrostatic balance of our text-books, but a hydrometer adapted for weighing purposes, as a substitute for the common beam balance.

THE Weather Bureau of Washington has just issued a preliminary report (Weather Bulletin, No. 208) on the kite observations of 1898, by H. C. Frankenfield, containing an interesting discussion of the vertical gradients of temperature, humidity and wind-direction at a number of stations in the United States. The report deals with probably the largest amount of free air meteorological observations taken in the same space of time, and is a valuable contribution to the general knowledge of the physics of the lower levels of the atmosphere. The mean rate of diminution of temperature with increase of height, as determined from 1217 ascents to 1000 feet or more, was 5°·0 for each 1000 feet. The largest gradient, 7°·4 per 1000 feet, was found up to 1000 feet, after which there was a steady decrease up to 5000 feet, the rate becoming less as the altitude increased. The gradient up to 5000 feet was 3°·8 per 1000 feet; above this altitude there appears to be a tendency to a slow rise. The relative humidity at and above the surface of the earth differed but little, except at 7000 feet, where the surface humidity was 11 per cent. less than that above. The mean result obtained from all the observations showed 60 per cent. at the surface and 58 per cent. above, a difference only of 2 per cent. The work contains an important introductory paper, by Prof. C. F. Marvin, on the construction and operation of the kite meteorograph.

DR. K. DANILEWSKY has sent to the *Scientific American* some interesting photographs and particulars of the latest improvements he has made in his balloon-flying machine. The experiments were conducted under the auspices of the Russian Government in order to give the inventor an opportunity of demonstrating the practicability of this dirigible air-ship, and its feasibility for use in the Signal Service Corps of the Russian Army. The balloon is shown descending in the accompanying picture. It is filled with pure hydrogen, and its comparatively small size makes it easy to manage, three or four men being sufficient to start it, and half an hour long enough to fill it with gas. The balloon possesses sufficient force of ascension, or levity, to neutralise the weight of the man and tackle suspended from it. The work done by the aëronaut may thus be entirely devoted to propelling and steering the balloon, apparently by means of wing-systems, which are not described in the *Scientific American*, but may be seen in the illustration. At one of the trials of this flying-balloon, Dr. Danilewsky ascended from a certain place, disappeared from view and remained out of sight for two hours, and then returned close to the shed from which the balloon started. The experiments have induced a number of Russian experts to state that in their opinion Dr. Danilewsky has presented a practical solution of the problem of aërial navigation.



The Danilewsky Dirigible Balloon.

THE Botanical Garden at Buitenzorg, Java, has followed the example of that at Kew, and those of some of our Colonies, in bringing out a *Bulletin* in addition to the well-known *Annales*. The issue of the *Bulletin* of the Boissier Herbarium at Geneva has been discontinued, and its place will be taken by *Mémoires de l'Herbier Boissier*, to be published at irregular intervals.

WE have received the first number (January 1900) of the *Journal of the New York Botanic Garden*, edited by the Director of the Laboratories, Prof. T. D. Macdougal. It commences with an account, accompanied by an illustration, of the Museum Building, which claims to be "the largest, most elegant, most satisfactorily illuminated, and for its purposes the best adapted, of any similar edifice in the world." A description is given of the structure of the building, of its lecture-theatre, museums, library, and laboratories. The General Museum is designed to exhibit types of all the families and tribes of plants, from the slime-moulds or Myxomycetes to the Compositæ; and an interesting feature of the collection is that fossil plants are shown along with the living ones to which they are most nearly related. Then follow short papers on comparative forestry; on etiolated plants as food; on mycorhizas of orchids, in which it is stated that the roots and underground organs of every one of more than seven hundred species examined were found to be infested by symbiotic fungi; and on colours.

WE have received the fifth number of another new Argentine scientific journal, *Comunicaciones del Museo Nacional di Buenos Aires*. To this part Señor Ameghino contributes an illustrated account of a small skull from the Paranà deposits described last year under the name of *Arrhinolemur*, and now regarded as indicating a new order of mammals allied to the Lemurs. This skull, which is remarkably short and broad, presents the unique feature of having the nasals soldered together and placed in a cleft between the maxillæ and the premaxillæ in such a manner that, according to its describer, there is no nasal aperture! Another peculiarity is the presence of a preorbital vacuity in the cranium, and of an unossificed space on each side of the dentary portion of the lower jaw; in both of which respects it resembles the skulls of certain reptiles and birds. If rightly described, and really mammalian, the specimen is of surpassing interest, and demands the best attention of systematists. In another article in the same journal, Señor Mercerat contributes his quota to the already teeming literature on the "last of the ground-sloths" (*Neomylodon* or *Glossotherium*), in the course of which he severely criticises the determinations made by his countrymen of some of the associated remains of other animals.

THE Report for 1899 on the Lancashire Sea-fisheries Laboratory at University College, Liverpool, and the Sea-fish Hatchery at Piel, drawn up by Prof. Herdman, contains a very important account of the common cockle by Mr. J. Johnstone, who treats his subject both from the zoological and the economical point of view. The anatomy of this mollusc is very fully described, with some excellent figures; but the chief general interest centres on the economical aspect. Cockles form the food of several kinds of valuable fishes, more especially the plaice and the dab, while vast numbers are said to be consumed by the larger sea-birds. And we have a remarkable instance of how protection afforded to one group of animals reacts on another, in the statement that the recent decrease in some of the Lancashire cockle-beds is directly attributable to the increase in sea-gulls due to the operation of the Sea-Birds Preservation Act. The enormous commercial value of the Lancashire cockle-fishery will probably come as a revelation to the majority of our readers. It is stated that 2*s.* per cwt. is a low estimate of the value of the molluscs to the fishermen, since a certain quantity are hawked in the district; but, supposing the greater amount to be sent to market by rail, about 6*s.* per cwt. will represent fairly the price paid by the consumer. In the year May 1899, the total weight of cockles taken in Lancashire was 6685 tons, of which the money value at 2*l.* per ton is 13,370*l.*, and at 6*l.* per ton 40,110*l.*

Mr. H. F. Witherby has sent us an interesting little *brochure*, entitled "Two Months on the Guadalquiver," being a reprint of articles contributed to *Knowledge*. The author made his trip for the purpose of studying the abundant bird-life of the valley. Some of his most interesting experiences were those connected with the Great Bustard. These noble birds were observed among long grass and corn; and from his observations Mr. Witherby was led to conclude that the only season when they could be coursed by dogs would be the period of the moulting of the old quills and the sprouting of the new, since at other times Bustards take at once to their wings and fly strongly.

Mr. J. J. Sederholm, director of the Geological Survey of Finland, has been engaged for several years in the exploration of the Archæan rocks of his mother-country. His exhaustive work on this subject, "Ueber eine archäische Sediment-Formation in Süd-westlichen Finland," accompanied by an excellent geological "Uebersichtskarte" of Finland (1:2,500,000), another of the Tammerfors region on a larger scale, and numerous engravings, was published, in German, in the *Bulletin* of the Finnish Geological Survey, No. 6, in February last. Mr. Sederholm, using a quotation from Prof. Lapworth's introduction to his memoir, places himself explicitly under the banner of English actualism, and he endeavours to show that the presumption of the followers of Lyell and Darwin in favour of the existence of an immense thickness of pre-Cambrian sediments is fully verified by a detailed study of the pre-Cambrian rocks in Northern Europe. He describes in great detail a typical area of Archæan crystalline schists, which are so slightly metamorphic that their original clastic character can almost everywhere be detected, as also their gradual change into gneiss-like rocks, mainly through the intervention of granite veins. Shortly describing next the Archæan sediments of Eastern Finland, and referring to the former observations of Archæan clastic and effusive-eruptive rocks by Swedish geologists and by himself, the author concludes that his ideas can be generalised so as to hold good for the whole of the pre-Cambrian region of Northern Europe, and thus have a bearing upon the solution of the Archæan problem altogether.

Messrs. H. Sotheran and Co. have just issued a catalogue of superior second-hand books in natural history which they are offering for sale.

The current number of the *Geological Magazine* contains a notice of the life and work of the Rev. Osmond Fisher, the well-known author of the "Physics of the Earth's Crust." The memoir, which is illustrated by a copy of a recent photograph, forms one of the series of "Eminent Living Geologists."

The "Anales de la Oficina Meteorologica Argentina" (Tomo xii.), edited by Mr. G. G. Davis, contains a discussion of the meteorological observations made at Asuncion, the capital of Paraguay, and Rosario, in Santa Fé. The volume is the second part of a work on the climate of these places.

A second edition of Prof. E. Mach's "Principien der Wärmelehre" has just been published by J. A. Barth, of Leipzig. The original work was reviewed in Nature in April 1896 (vol. 55, p. 529), and few alterations other than necessary corrections have been made. The full page portraits of physicists are better than they were in the first edition.

The first part of "The Birds of Eastern North America," dealing with water birds, by Mr. C. B. Cory, was noticed in our issue of February 1 (p. 323). The second part, in which the land birds of the same region are described, has since been received, and is similar in character to the previous volume, and of equal importance.

With regard to a remark made in the notice of Kölliker's "Gewebelehre," Bd. iii. 1 Hälfte, in Nature of February 1, as to the absence of an index, we have been informed by the publishers that their intention is to provide an index on the completion of the whole work, which they anticipate will be in about a year from the present time. It may, however, be pointed out that as each part is practically a monograph upon its special department of histology, and as eleven years has elapsed since the appearance of the first part, the absence of an index to each part is a practical inconvenience which it would have been worth a little extra cost to remedy.

The latest number of the *Bulletin* of the Liverpool Museums, edited by Dr. H. O. Forbes, is a most creditable publication, profusely illustrated and full of scientific contributions of prime importance. Dr. Forbes is sole or joint author of three articles of the four which make up the *Bulletin*. He describes in detail a collection of stone implements in the Mayer Museum, made by Mr. H. W. Seton-Karr, in mines of the ancient Egyptians discovered on the plateaux of the Nile Valley. Numerous excellent illustrations of the implements and the workings where they were discovered, by Mr. Seton-Karr, accompany the article. As further evidence of the noteworthy character of the *Bulletin*, we may remark that there are described in it fourteen new species of birds, one new genus and six new species of reptiles, eight new species of molluscs, one new genus and thirty-three new species of insects, and eleven new species of arthropoda, many of them representing the results of the expedition to Sokotra, organised conjointly by the British Museum and the Liverpool Museum. A special volume on the expedition will shortly be issued, and, judging from the present preliminary contribution, it will be a very valuable addition to science.

The true molecular weight of sulphur in the gaseous states has been made the subject of numerous researches. In the current number of the *Berichte*, O. Bleier and L. Kohn give an account of their work on the density of sulphur vapour at very low pressures. They hoped to be able to make determinations at such a low pressure that there would be no dissociation, but even for a pressure of 2·1 mm. of mercury the found molecular weight was 251 instead of 256, corresponding to S_8. The results obtained, plotted in the form of a curve, were quite sufficient, however, to show that the true molecular formula of gaseous sulphur, undissociated, is S_8, a value, it is interesting to note, which is in agreement with the conclusions previously arrived at by the application of the freezing-point and boiling-point methods to sulphur solutions.

Recent discoveries in the space isomerism of nitrogen compounds have led to attempts to resolve into active constituents compounds containing asymmetric sulphur atoms. Two papers bearing on this subject have recently been read before the Chemical Society, by S. Smiles, and W. J. Pope and S. J. Peachey, respectively. In both cases methyl-ethyl-thetine was the starting-point, Smiles attempting, unsuccessfully, to prepare a strychnine or cinchonine salt of the thetine hydrobromide, or a malate of the base. Pope and Peachey succeeded in preparing two salts of the thetine with active acids (dextrocamphorsulphonic and dextro-α-bromocamphorsulphonic acids), but found that no resolution of the asymmetric thetine into optically active components occurs. Hence they draw the conclusion that if sulphur really exists as a quadrivalent element in these salts, the four atoms directly and independently attached to the sulphur lie in the same plane as the latter.

THE additions to the Zoological Society's Gardens during the past week include an Entellus Monkey (*Semnopithecus entellus*) from India, presented by Mrs. E. J. Gaudie; a Red Deer (*Cervus elaphus*. ♂) from Scotland, presented by the Right Hon. the Marquis of Breadalbane, K.G., P.C.; a Spanish Blue Magpie (*Cyanopolius cooki*) from Spain, presented by Mr. L. Ingram Baker; an Alligator Terrapin (*Chelydra serpentina*), a Floridan Terrapin (*Chrysemys concinna*), a Salt-water Terrapin (*Malacoclemmys terrapin*), a Sculptured Terrapin (*Clemmys insculpta*), four American Box Tortoises (*Cistudo carolina*), a Prickly Trionyx (*Trionyx spinifer*), two Reeves's Terrapins (*Damonia reevesi*), a Blue Lizard (*Gerrhonotus coeruleus*), a Three-striped Boa (*Lichanura trivirgata*), two Striped Snakes (*Tropidonotus sirtalis*), a Seven-banded Snake (*Tropidonotus septemvittatus*), four Corn Snakes (*Coluber guttatus*), a Chicken Snake (*Coluber obsoletus*), an American Black Snake (*Zamenis constrictor*), two King Snakes (*Coronella getula*), nine Changeable Tree-Frogs (*Hyla versicolor*) from North America, a Common Boa (*Boa constrictor*), an Annulated Terrapin (*Nicoria annulata*) from South America, eight Adorned Terrapins (*Chrysemys ornata*) from Central America, a Wrinkled Terrapin (*Chrysemys scripta rugosa*) from the West Indies, two Grooved Tortoises (*Testudo calcarata*) from South Africa, a Starred Tortoise (*Testudo elegans*) from India, deposited; two Tceheli Monkeys (*Macacus tcheliensis*, ♂ ♀) from Northern China, presented by Dr. S. W. Bushell; a Vulpine Phalanger (*Trichosaurus vulpecula*) from Australia, presented by Miss Freda Gilder; three Dial Birds (*Copsychus saularis*) from India, purchased.

OUR ASTRONOMICAL COLUMN.

DEFINITIVE ORBIT OF COMET 1897 III.—Herr E. Wessell, of the Helsingfors Observatory, has reduced 168 observations of Perrine's Comet, 1897 III, made at various observatories, and gives the resulting definitive elements of the orbit in the *Astronomische Nachrichten*, Bd. 151, No. 3614, as follow:—

Definitive Elements of Comet Perrine (1897 III.).

T = 1897 Dec. 8·679793 Berlin Mean Time.

$$\left.\begin{array}{rl} \omega = & 65^{\circ}\ 53'\ 57''\cdot 6 \\ ☊ = & 32\ \ \ 3\ \ \ 8\cdot 7 \\ i = & 69\ \ 35\ \ 58\cdot 2 \end{array}\right\} 1897\cdot 0.$$

$$\log q = 0\cdot 132477$$

NEW VARIABLE STAR IN DRACO.—Dr. T. D. Anderson, of Edinburgh, has communicated to the *Astronomische Nachrichten*, No. 3618, his recent discovery of the variability of a star having the following position:—

$$\left.\begin{array}{ll} \text{R.A.} & 17^{\text{h}}.\ 55\cdot 6^{\text{m}}. \\ \text{Decl.} & +54^{\circ}\ \ 51' \end{array}\right\} 1855.$$

The variation in magnitude is from 9·4 to 10·4. Neither the variable nor the four stars used for comparison are mentioned in the *Bonn Durchmusterung*.

TIME USED IN EPHEMERIDES.—With the current number of the *Observatory* is issued a slip stating that the variable star ephemerides, published in the *Annual Companion*, are given in Greenwich civil time, and not in astronomical time, as heretofore. The day is divided into 24 hours, and begins at midnight. This change was rendered necessary by reason of its having been adopted by M. Loewy in the *Annuaire du Bureau des Longitudes*, from which the data for the variable star ephemerides are obtained. It is thought that this change is responsible for the recent misleading reports as to the adoption by the principal observatories of the civil time reckoning.

LEONID METEORS.—Signor E. Fergola contributes to the *Rendiconto* of the Naples Academy a note on observations of the Leonid shower, made at the Observatory at Capodimonte. The numbers of meteors observed on November 14, 15, 16 and 17 were 15, 30, 32 and 11, and the radiant point, as determined by conjoint observations of Signori Alberti, Tedeschi and Nobili, was in R.A. 10h. 8m., and declination 23°′4s.

THE FUNCTIONS OF THE ENGINEER.[1]

THE success of the modern engineer is due to the fact that he has buried in the depths of oblivion the much-vaunted empirical rule of thumb, and that he has elevated to the heights of science the observations of exact practice and the exercise of pure reason. The principle of doubt, which is the root of all scientific inquiry, forces him to consider every phase of weakness in the materials that he employs in his structures, to examine every possible cause of error in his designs, to anticipate every source of failure in his work. The principle of faith, which is the outcome of the growth of his experience, must be continually illuminated by the light of progress, and controlled by the patient development and consideration of the too-long-hidden laws of nature. The engineer must maintain his acquaintance with ever-growing science so as to be able to fulfil promptly and accurately his duty, which is the application of the great principle of energy and the utilisation of the marvellous properties of matter to the wants, comfort and happiness of man.

In considering the functions of the engineer we have to consider his *practice* and his *making*.

His practice—what has he got to do? The practice of engineering can be divided into three branches: Civil, Military and Naval.

The term civil was originally introduced to distinguish the practical man of peace from the practical man of war. Engineering applied to our wants and comforts is a very different thing to that applied to the destruction of our foes or to protect ourselves from their wish to destroy us. War is waged both on land and sea, and as the conditions involved in attack and defence in modern times have become so totally different in these two cases, the term military has been gradually confined to the operations of our army on land, while the term naval is applicable to the warlike operations of our fleets. England owes her present position as the centre of a great empire to her naval supremacy, and she has acquired this supremacy as much by the inventive, constructive and maintaining powers of her working engineers as by the mighty deeds of her fearless fighting sailors.

Civil engineering aids us not only to build that haven of rest and comfort that we call home, but to surround it with the elements of health—pure air, pure water, pure food, pure light. If we congregate together in towns or scatter ourselves in country districts it supplies us with all possible means of transport by road, river and rail, and of means of intercommunication by post, telegraph and telephone. These means of annihilating time and space are not only inter-urban in our own country but international in our continents, and in a wider sense imperial, cosmical and universal, over the whole earth. The world is knit in one connected whole by wire. We know to-day from that triumph of art, science and culture—the intelligent and free British daily public Press—the history of nearly all that took place yesterday over the whole globe.

The engineer fears not the infinitely great, for the stars in their courses aid him to survey the land and to cross the deep with safety. He spurns not the infinitely little, for the molecules in their mutual actions and reactions supply him with those metals and those elements of purity and strength which give him the means to resist the forces of nature so as to span the broad channel, laugh at the foaming river, build the palace of glass at Sydenham, cover acres of ground so as to display this year in Paris the goods, manufactures, and works of art, industry and utility of the whole world.

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[1] An address by Sir William Henry Preece, K.C.B., F.R.S., delivered before the Glasgow Association of Civil Engineers on February 8.